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Diesel Particulate Matter Mitigation Plan for the Union Pacific Railroad Los Angeles Transportation Center (LATC) Rail Yard

prepared for:

Union Pacific Railroad Company

January 2009

prepared by:

Sierra Research, Inc.
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I. Introduction

In accordance with the 2005 California Air Resources Board (CARB)/Railroad Statewide Agreement (MOU), Union Pacific Railroad Company (UPRR) has prepared this Mitigation Plan for the UPRR Los Angles Transportation Center (LATC) Rail Yard. The purpose of this Plan is to outline the potential mitigation measures that can be used to reduce Diesel particulate matter (DPM) emissions from the LATC Rail Yard. The baseline inventory for calendar year 2005 and initial estimates of health risk associated with Yard operations are detailed in the *Health Risk Assessment for the Union Pacific Railroad Los Angles Transportation Center Railyard* (CARB, 2007).[1] This Plan contains sections detailing how the baseline and projected emissions were calculated, a discussion of updates to the 2005 baseline inventory since the Health Risk Assessment (HRA) Report was published by CARB, a discussion of projected growth rates and proposed mitigation measures, and a discussion of the mechanisms that will be used to track progress.

As discussed below, the proposed mitigation measures, when fully implemented, will reduce the DPM emissions from the LATC by approximately 63% from 2005 levels, even after accounting for anticipated growth in yard activities (see Section V for a discussion of the predicted growth rate).[2] These emission reductions will concurrently lower any predicted health risk associated with the facility's operations.

II. Summary of Rail Yard Operations

The LATC Yard is an intermodal container facility. Cargo containers are received, sorted, and distributed from the facility. Intermodal containers may arrive at the facility by truck to be loaded onto trains for transport to distant destinations, or arrive by train and unloaded onto chassis for transport by truck to local destinations. Cargo containers and chassis are also temporarily stored at LATC.

Activities at LATC include receiving inbound trains, switching cars, loading and unloading intermodal trains, storing intermodal containers and chassis, building and departing outbound trains, and repairing freight cars and intermodal containers/chassis.

[1] Available at *http://www.arb.ca.gov/railyard/hra/up_latc_hra.pdf.*

[2] Note that due to the current economic downturn, 2008 saw a decline in traffic, and a further decline is projected in 2009; therefore, emissions are likely to be significantly lower today than is assumed in this Mitigation Plan. To be conservative, however, this analysis assumes a constant growth of 1% per year.

Facilities within LATC include classification tracks, a gate complex for inbound and outbound intermodal truck traffic, intermodal loading and unloading tracks, and various buildings and facilities supporting railroad and contractor operations.

Emission sources include, but are not limited to, locomotives, on-road Diesel-fueled trucks, heavy-heavy-duty Diesel-fueled trucks, cargo handling equipment (CHE), heavy equipment, and TRUs and refrigerated railcars (reefer cars).

III. Emissions Summary

Table 1 shows the DPM emissions from the LATC, by equipment category, for the 2005 baseline year, calendar year 2007, and for future years as the mitigation measures proposed in this Plan are implemented over time. Since the CARB HRA report was released in April 2008, additional information has become available and the 2005 baseline emission inventory has been adjusted accordingly. Table 1 shows the original 2005 emission estimates as well as the adjusted 2005 emission estimates. Each inventory update is discussed below.

As shown in Table 1, when the proposed mitigation measures are implemented, DPM emissions will be reduced by approximately 63% from 2005 levels, even after accounting for expected growth in yard activities (see Section V for a discussion on the predicted growth rate). These emission reductions will concurrently lower any existing predicted health risk related to facility operations. A detailed discussion of each mitigation measure is provided in Section VI.

Table 1
Summary of Emissions from the UPRR LATC Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[e]	2015[e]	2020[e]
Locomotives	3.2	3.2	3.0	3.0	2.7	2.4
Line Haul[c]	*0.7*	*0.7*	*0.6*	*0.6*	*0.5*	*0.4*
Switch	*2.5*	*2.5*	*2.4*	*2.4*	*2.3*	*2.0*
Light Duty Yard Trucks	0.0	0.0	0.0	0.0	0.0	0.0
HHD Diesel-Fueled Drayage Trucks	1.0	1.1	0.9	0.7	0.3	0.2
Cargo Handling Equipment (CHE)	2.5	1.0	0.8	0.7	0.1	0.1
Heavy Equipment	0.2	0.2	0.1	0.1	0.0	0.0
Transport Refrigeration Units (TRUs)	0.5	0.5	0.5	0.2	0.0	0.0
Total[f]	**7.3**	**5.9**	**5.2**	**4.6**	**3.2**	**2.7**

Notes:

a. From the *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Railyard* (CARB, 2007).
b. Based on new information, the emission estimates presented in the CARB HRA have been adjusted. See the Inventory Updates section below for details.
c. Line haul emission estimates include both in-yard activity and by-passing through trains.
d. Emissions from cargo handling equipment were adjusted to reflect the use of a more appropriate engine load factor for yard hostlers. See Section III for a complete discussion.
e. Includes growth in Yard related activities (see Section V) and the proposed mitigation measures (see Section VI).
f. The numbers shown may not add precisely due to rounding.

Inventory Updates

In the adjusted 2005 inventory, the default engine load factor for yard hostlers has been revised based on new, more representative data. The default load factor used in the original 2005 inventory (65%) for yard hostlers was taken from the OFFROAD model, which is based on data collected for equipment operating at various facilities, and not specifically at an intermodal rail yard.[3] Additional data have been collected by both UPRR and Burlington Northern Santa Fe (BNSF) Railway to determine an appropriate engine load factor for yard hostlers operating at intermodal rail yards. The data collected by both railroads show that the default load factor from the OFFROAD model and the load factor from the Ports study are too high for yard hostlers operating at intermodal rail yards. Based on the UPRR and BNSF data, a more appropriate load factor for yard hostlers operating at intermodal rail yards is between 15% and 20%. Therefore, with the concurrence of CARB, the 2005 baseline emission estimates for yard hostlers that were presented in the CARB HRA report have been recalculated using a load factor of 20%.

Also, a new version of the EMFAC model (EMFAC2007) was released after the HRA emission inventory was completed. The emission factors for heavy-heavy-duty drayage truck operations were calculated using the EMFAC model. The latest version of the model contains updated emission factors and accounts for emission reductions that will be achieved from the implementation of recently adopted Rules and Regulations. Thus, the 2005 baseline emission estimates for drayage truck operations were revised based on the EMFAC2007 model.

In addition, in December 2007, CARB adopted the Regulation to Control Emissions from In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks (Drayage Truck Rule). This Regulation, when implemented, will reduce emissions from drayage trucks transporting cargo between California's Ports and intermodal rail yards. If the Regulation is implemented as planned, CARB expects an 86% reduction of DPM emissions from drayage truck operations from 2007 levels by 2014. These reductions will be above and beyond the reductions shown in Table 1. Thus, the projected emission estimates for the 2010–2020 period are conservative, but temporally and operationally realistic.

IV. Emission Inventory Methodology

For each equipment category, a general discussion of the analytical methodology and assumptions for each equipment category used to calculate emissions for the 2005 baseline and calendar year 2007 inventories, and to forecast emissions for calendar years for future years, is provided below and in Appendix A. Detailed emission calculations for the 2005 baseline year can be found in the *Toxic Air Contaminant Emission Inventory*

[3] A yard hostler engine load factor of 39% was calculated based on data collected at the Ports of Los Angeles and Long Beach, and was used in the HRA report for the UPRR ICTF rail yard, at CARB's direction. The 65% default factor from the OFFROAD model was used in the HRA report for the UPRR LATC rail yard.

and Dispersion Modeling Report for the Los Angeles Transportation Center, Los Angeles, California (Sierra Research, 2007).[4]

1. Locomotives

Table 2
Summary of Emissions from Locomotives
at the UPRR LATC Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[c]	2015[c]	2020[c]
Line Haul[d]	0.7	0.7	0.6	0.6	0.5	0.4
Switch	2.5	2.5	2.4	2.4	2.3	2.0
Total	**3.2**	**3.2**	**3.0**	**3.0**	**2.7**	**2.4**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Railyard* (CARB, 2007).
b. 2005 adjustments do not affect locomotive emission estimates.
c. Includes growth in Yard related activities (see Section V) and the proposed mitigation measures (see Section VI).
d. Line haul emission estimates include both in-yard activity and by-passing through trains.

Analytical Method for Calculating Emissions

For the 2005 baseline year, emissions from the LATC Yard's operational locomotives were estimated for (1) "road power" (locomotives arriving and departing from the Yard with intermodal and manifest freight trains), and (2) yard switching operations.

- 2005 Road Power Emissions – UPRR databases provided basic information on all trains arriving and departing the LATC Yard during calendar year 2005. These data included the number of trains and the number of locomotives on each train. UPRR data also provided the individual locomotive model, emission control technology (as defined by EPA Tier), and whether the locomotive was equipped with automatic start/stop idle control devices.

- Emission factors for individual locomotive models and control technologies were adjusted in accordance with CARB guidance for the effects of fuel sulfur content in 2005 for both California fuel and fuel delivered in other states. These emission factors were used to calculate total emissions associated with movements into and out of the Yard based on routes followed, speeds, and throttle settings, as well as estimated idle time on arrival, and idle time prior to departure.

- 2005 Yard Switching Operations – LATC Yard operations include the use of five sets of two low-horsepower switcher locomotives. Emissions for the 2005

[4] Available at *http://www.arb.ca.gov/railyard/hra/sr_latc_rpt.pdf.*

baseline year were calculated based on emission factors for the specific locomotive models in use, the hours of operation, and the USEPA switcher duty cycle.

- 2005 Service and Maintenance Operations – There is no locomotive service facility at LATC. Locomotives are sent to, and return from, service facilities at other nearby yards (primarily UPRR Commerce).

2007 Emission Inventory

Locomotive emissions for line-haul operations were calculated from UPRR data for calendar year 2007 in the same manner as the emissions for the 2005 baseline year. Emission factors for 2007 were updated from those for 2005 to reflect the reductions in sulfur content for both California fuel and 47-state fuel. California refinery data show that California fuel sulfur content was reduced from 221 ppm in 2005 to 4.8 ppm in 2007. EPA's 2004 forecasts for sulfur content for 47-state fuel estimated 2639 ppm S for 2005 and 1328 ppm S for 2007.

Yard switching emissions estimates were calculated based on the assumption that hp-hrs of work by switchers is proportional to the total trailing tons of originating and terminating freight, using the 2005 estimate as the baseline. Total trailing tons of freight decreased by approximately 0.9% from 2005 to 2007. Trailing tons of freight (and therefore, total yard switching hp-hrs of work) were assumed to increase at 1% per year after 2007.

2010-2020 Emission Inventory Forecast

UPRR locomotive acquisition and retirement projections were used to develop model- and tier-specific growth rates from 2005 to 2012.[5] These rates were applied to the observed fleet distribution at the LATC Yard in 2005 to generate 2012 emission factors for the LATC fleet. Locomotive emissions for 2010 were developed by interpolation between the LATC 2007 fleet's emissions and those for 2012 assuming a 1% per year growth in locomotive activity beginning in 2008.[6] The locomotive fleet model and technology distribution for the 2012 inventory was developed from the 2005 base year distribution and UPRR locomotive acquisition and retirement projections. One half of the line haul locomotives at LATC in 2012 were assumed to have the projected distribution. To reflect UPRR's response to the 1998 CARB MOU, the other half of the line haul fleet at LATC in 2012 was assumed to include equal fractions of Tier 2 Dash 9 and SD-70 locomotives. The fuel sulfur content in 2012 was projected to be 15 ppm for California fuel and 123 ppm for 47-state fuel. Emission factors for 2012 were calculated

[5] The 2012 acquisition and retirement projections were submitted to U.S. EPA and CARB as part of the 1998 MOU reporting requirements.
[6] See footnote 2 above.

to reflect the projected fuel sulfur content for California fuel and 47-state fuel in the same manner as was used for the 2007 inventory.

Emissions estimates for 2015 and 2020 were projected from the 2012 inventory based on 1% per year growth in activity. In addition, USEPA forecasts of average line haul locomotive emissions presented in the Regulatory Impact Analysis for locomotive emission controls (EPA, 2008) and adjusted for the EPA-assumed growth rate of 1.6% per year in fuel consumption were used to derive control factors reflecting the effects of future mandated improvements in locomotive emission control technology. These control factors were applied to the line haul emissions estimates for 2010, 2015 and 2020.

2. HHD Diesel-Fueled Drayage Trucks

Table 3
Summary of Emissions from Drayage Trucks
at the UPRR LATC Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj	2007	2010[b]	2015[b]	2020[b]
Traveling Emissions	0.7	0.8	0.6	0.5	0.2	0.1
Idling Emissions	0.3	0.3	0.2	0.2	0.1	0.1
Total[c]	**1.0**	**1.1**	**0.9**	**0.7**	**0.3**	**0.2**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Railyard* (CARB, 2007).
b. Includes growth in Yard related activities (see Section V) and the proposed mitigation measures (see Section VI).
c. The numbers shown may not add precisely due to rounding.

Analytical Method for Calculating Emissions

The 2005 baseline DPM emission estimates for drayage trucks operating at the LATC were based on the number of truck trips, the length of each trip, and the amount of time spent idling. Gate count data were used to determine the number of HHD trucks that operated at LATC during the 2005 calendar year. UPRR personnel count the number of cargo containers processed through both the "in" and "out" gates of the Yard. Since each HHD truck holds only one cargo container, the gate counts were used to determine the number of HHD truck trips for 2005. Trucks that enter or exit the facility without a chassis and/or a cargo container are referred to as "bobtails." Based on interviews and personal communication with the Intermodal Operations Manager at LATC, the monthly gate counts were increased by 25% to account for bobtails.

The number of truck trips for calendar year 2007 was based on the actual gate count data for 2007 plus 25% to account for bobtails. For future years 2010-2020, the number of truck trips was based on the 2007 gate count data plus a growth factor of 1% per year. See Section V for a discussion on the growth rate.

In addition to the emissions from truck movements, an average idling time of 30 minutes per trip was assumed, to account for emissions during truck queuing, staging, loading, and/or unloading during the 2005 baseline year. Based on discussions with the Intermodal Operations Manager, the average queuing time at the gate at LATC is less than 10 minutes per truck. In addition to idling during queuing, it was assumed that each truck idles an average of 15 minutes per trip while the chassis is connected/disconnected from the truck tractor. An additional five minutes of idling per trip was included to account for any other delays. No change in idling time per trip was assumed for calendar year 2007 or future years 2010-2020.

A fleet average emission factor for traveling exhaust emissions was calculated using CARB's EMFAC2007 model with the BURDEN output option.[7] Since the fleet distribution is not known, the EMFAC2007 default distribution for Los Angeles County was used. Idling emission factors were calculated using the EMFAC2007 model with the EMFAC output option. Separate model runs were performed for each year.

3. Cargo Handling Equipment (CHE)

Table 4
Summary of Emissions from Cargo Handling Equipment at the UPRR LATC Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[c]	2015[c]	2020[c]
Cargo Handling Equipment	2.5	1.0	0.8	0.7	0.1	0.1

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Railyard* (CARB, 2007).
b. Based on new information, emissions from cargo handling equipment were adjusted to reflect the use of a more appropriate engine load factor for yard hostlers. See Section III for a complete discussion.
c. Includes growth in Yard-related activities (see Section V) and the proposed mitigation measures (see Section VI).

Analytical Method for Calculating Emissions

The 2005 baseline year DPM emissions from CHE operating at the LATC were based on the number and type of equipment, equipment model year, equipment size, and the annual hours of operation. The hours of operation during the baseline year were obtained from UPRR staff. Equipment-specific emission factors were calculated using a spreadsheet developed by CARB staff and are based on the OFFROAD2007 model. As

[7] Emission factors in grams per mile (g/mi) were calculated from the tons per day emissions (tpd) estimates and daily VMT estimates generated by the EMFAC2007 model (see Appendix A for model output). The tpd emission estimates were converted to g/mi as follows: g/mi = tpd x (2000 lb/ton) x (453.59 g/lb) x (1 day/(VMT x 1000)).

discussed above, the load factor that was used for the yard hostlers for 2005 was adjusted from the default factor of 65% from the OFFROAD model to 20% based on data collected by UPRR and BNSF.

Equipment-specific operation data were not available for calendar year 2007. Therefore, the 2007 hours of operation were assumed to be equal to the 2005 baseline year hours of operation for each equipment unit, multiplied by the ratio of the 2007 lift count to the 2005 lift count. At the end of 2006, UPRR retired two older, higher-emitting, rubber-tired gantry (RTG) cranes. In 2007, a higher-emitting RTG was retired and replaced with a new, cleaner unit; in 2008, an older, higher-emitting top pick was replaced with a new unit. The fleet makeup for the 2007 and future year emission estimates were adjusted accordingly. In addition, in December 2006, CARB's *Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards* (CHE Regulation) became effective and the 2005 baseline equipment-specific DPM emission factors were adjusted, as needed for future year emission calculations, to show the emission reductions that will be achieved through compliance with the CHE Regulation.

For future years 2010–2020, the 2005 baseline year hours of operation were adjusted by the ratio of the predicted future year lift count[8] to the 2005 actual lift count. The fleet mix was adjusted to account for the addition or removal of equipment. In addition, the 2005 baseline equipment-specific DPM emission factors were adjusted, as needed, to show the emission reductions that will be achieved through compliance with the CHE Regulation. It was assumed that compliance with the Regulation would be achieved through the use of verified Diesel emission control strategies (VDECS). To be conservative, it was assumed a Level 2 (50% reduction) VDECS would be used.

4. Heavy Equipment

Table 5
Summary of Emissions from Heavy Equipment
at the UPRR LATC Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[c]	2015[c]	2020[c]
Diesel-Fueled Heavy Equipment	0.2	0.2	0.1	0.1	0.0	0.0

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Railyard* (CARB, 2007).
b. 2005 adjustments do not affect heavy equipment emission estimates.
c. Includes growth in Yard-related activities (see Section V) and the proposed mitigation measures (see Section VI).

[8] See Section V for a discussion of the projected growth rates for the facility. Predicted lift counts are shown in Appendix B.

Analytical Method for Calculating Emissions

The 2005 baseline year DPM emissions from heavy equipment operated at LATC were based on the number and type of equipment, equipment model year, equipment size, fuel type, and the annual hours of operation. The hours of operation during the baseline year were obtained from UPRR staff. Equipment-specific emission factors were calculated using the OFFROAD2007 model.

Equipment-specific operational data were not available for calendar year 2007. Therefore, the 2005 baseline year hours of operation for each equipment unit were adjusted by the ratio of the 2007 lift count to the 2005 lift count. The fleet mix was adjusted, as needed, to account for equipment being added or removed from the fleet.

All Diesel-fueled heavy equipment operated at intermodal rail yards must comply with the CHE Regulation. Therefore, the 2005 baseline equipment-specific DPM emission factors for the UPRR owned equipment were adjusted, as needed, to show the emission reductions that will be achieved through compliance with the CHE Regulation.

For future years 2010–2020, the 2005 baseline year hours of operation were adjusted by the ratio of the predicted future year lift count to the 2005 actual lift count. The 2005 baseline equipment-specific DPM emission factors for UPRR owned equipment were adjusted, as needed, to reflect the emission reductions that will be achieved through compliance with the CHE Regulation. It was assumed that compliance with the CHE Regulation will be achieved through the use of a VDECS. To be conservative, it was assumed a Level 2 (50% reduction) VDECS would be used.

5. Transport Refrigeration Units (TRUs) and Refrigerated Railcars (Reefer Cars)

Table 6
Summary of Emissions from TRUs and Reefer Cars
at the UPRR LATC Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010[c]	2015[c]	2020[c]
TRUs	0.4	0.4	0.4	0.1	0.0	0.0
Reefer Cars	0.1	0.1	0.1	0.1	0.0	0.0
Total	**0.5**	**0.5**	**0.5**	**0.2**	**0.0**	**0.0**

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Railyard* (CARB, 2007).
b. 2005 adjustments do not affect TRU and reefer car emission estimates.
c. Includes growth in Yard-related activities (see Section V) and the proposed mitigation measures (see Section VI).

Analytical Method for Calculating Emissions

The 2005 baseline year emissions from TRUs and reefer cars are based on the average size of the units, the average number of units in the Yard, and the hours of operation for each unit. The hours of operation were from CARB's *Staff Report: Initial Statement of Reason for Proposed Rulemaking for Airborne Toxic Control Measure (ATCM) for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate* (October 2003).[9] It is assumed the number of units and the annual hours of operation remain constant over the course of each year, with individual units cycling in and out of the Yard. Emission factors for TRUs and reefer cars were obtained from the OFFROAD2007 model.

For the 2007 calendar year and 2010-2020 future year emission estimates, the average number of units in the Yard was calculated by multiplying the 2005 equipment count data by the ratio of the predicted future year lift count to the 2005 lift count. The 2005 baseline year DPM emission factors were adjusted, as needed, to show the emission reductions that will be achieved through compliance with the TRU ATCM. UPRR does not own or operate the TRUs that pass through the LATC Yard. Therefore, specifics on how units will comply with the ATCM were not available. For the purposes of this Plan, it is assumed that all TRUs operating in the Yard will comply with the emission levels contained in the ATCM by the compliance deadline.

6. Other Miscellaneous Diesel-Fueled Equipment

Table 7
Summary of Emissions from Light Duty Yard Trucks at the UPRR LATC Rail Yard

Equipment Category	DPM Emissions (TPY)					
	2005[a]	2005-Adj[b]	2007	2010	2015	2020
Light Duty Yard Trucks[c]	0.001	0.001	0.001	0.001	0.001	0.001

Notes:
a. From the *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Railyard* (CARB, 2007).
b. 2005 adjustments do not affect these emission estimates.
c. Due to the negligible emissions from this source, it was assumed that there was no change in operations or emissions for 2007 and future years.

Analytical Method for Calculating Emissions

Emissions from the single light-duty Diesel-fueled truck operating at LATC are based on the engine model year, vehicle class, annual vehicle miles traveled (VMT), and the

[9] Available at *http://www.arb.ca.gov/regact/trude03/trude03.htm*.

amount of time spent idling. Vehicle-specific emission factors for travel exhaust and idling were calculated using the EMFAC2007 model.

Due to the negligible emissions from this source, emission factors and activity data were assumed to be unchanged from the 2005 baseline year for 2007 and future years.

V. Projected Growth Rates

The emission estimates presented in Table 1 account for the expected growth in operations at UPRR's California facilities. While it is not possible to accurately predict future goods movements needs, a reasonable estimate of growth was determined based on historic data. Based on a review of historic fuel use data and other historic operational factors, such as lift counts, tons of freight, etc., and discussions with CARB staff, it was determined that a long-term growth rate of 1% per year is appropriate for the LATC[10]. Detailed data, including Diesel fuel consumption, revenue ton-miles of freight, and gross ton-miles of freight, are contained in Appendix B.

VI. Mitigation Measures

1. Current Mitigation Measures

As shown in Table 1, by 2007, emissions of DPM have been reduced 29% from the 2005 baseline year. These reductions were achieved through the implementation of the measures listed below.

- Retrofit of idle control devices – By the end of 2007, 96% of UPRR's intrastate locomotives had been equipped with idle control devices. By June 2008, 100% of UPRR's intrastate locomotives were equipped with idle control devices.

- Use of idle control devices on new locomotives – All new locomotives purchased since 2001 are equipped with factory-installed automatic idle control devices.

- Increased fuel efficiency – Aggressive fuel consumption efforts have achieved a 12% improvement in fuel efficiency since 1995.

- Cleaner new line haul locomotives – UPRR has acquired more than 1,100 new, cleaner Tier 2 line haul locomotives since they were introduced in 2005.

- Cleaner existing line haul locomotives – UPRR has remanufactured more than 2,000 older line haul locomotives with new, lower emitting components since 2000.

[10] See footnote 2 above.

- Cleaner switch locomotives – ULEL switchers have been introduced, and there are currently 70 ULELs operating at UPRR facilities throughout Southern California.

- Cleaner fuels – Only Ultra-Low Sulfur Diesel (ULSD) fuel is being dispensed in California.

- Cleaner cargo handling equipment – Since 2005, UPRR has retired three higher-emitting RTGs. An older, higher-emitting top pick will be retired in 2008. A new RTG and top pick, equipped with the cleanest engines available, have been purchased for the Yard. In addition, a VDECS will be installed on each new unit during 2009. The installation of the VDECS will further reduce the DPM emissions from these units.

- Employee training – Aggressive employee training is being implemented to reduce unnecessary idling and ensure trains are operated in the most efficient manner by the locomotive engineers, thereby reducing fuel consumption and emissions.

2. Proposed Future Mitigation Measures

To achieve additional DPM reductions, UPRR proposes to implement the mitigation measures outlined below.

- Continued acquisition of Tier 2 line haul locomotives and newer technology locomotives as they become available.

- Continued remanufacture and retrofit of older line haul locomotives with new, lower-emitting components and automatic idle controls.

- Continued retirement of older locomotives from the fleet.

- Continued reductions in unnecessary locomotive and equipment idling through employee training.

- Continued modernization of CHE – By the end of 2010, all of the 1988-2006 model year CHE that is currently operating at the LATC (a total of 6 units) will be in compliance with the CHE Regulation. All new units purchased for the Yard will be equipped with either an engine certified to the Tier 4 standards or an engine certified to the highest available Tier combined with a VDECS.

- Cleaner drayage fleet – Natural fleet turnover coupled with the Port's Clean Truck Program and CARB's proposed drayage truck regulation will continue to reduce DPM emissions from these vehicles.

- Cleaner TRUs – Beginning in 2008, TRUs will be required to meet lower emission standards contained in the ATCM. The standards are further reduced beginning in 2010.

VII. Evaluation of Additional Mitigation Measures

In addition to the proposed mitigation measures discussed above, UPRR will evaluate the use of other mitigation measures, on a case-by-case basis. Measures that are found to be safe, legal, technologically and operationally feasible, and cost-effective will be further evaluated for implementation.

VIII. Mechanisms for Tracking Progress

UPRR will track the progress and effectiveness of the mitigation measures using a variety of methods. Mechanisms for tracking progress could include, but are not limited to, the following:

- Recordkeeping – The CHE Regulation requires detailed recordkeeping and reporting for all CHE fleets. These records can be used to determine when higher-emitting equipment is replaced by newer, cleaner technology and/or when a VDECS has been installed.

  In addition, UPRR maintains detailed records of Diesel fuel usage. A reduction in the amount of fuel used corresponds to a reduction in emissions.

- Compliance with Regulations – By maintaining compliance with current and proposed regulations, such as the CHE Regulation, UPRR will be able to demonstrate a reduction in DPM emissions at the LATC Yard.

- Compliance with Other Agreements – By demonstrating compliance with the 1998 MOU, which requires locomotives operating in the South Coast Air Basin to meet a Tier 2 equivalent, emission reductions at the LATC Yard can be shown.

- Inventory Updates – Periodic updates to the emission inventory can be used to demonstrate actual emission reductions achieved at the LATC Yard. Due to the time and data required to prepare a complete rail yard inventory, UPRR is proposing to prepare inventory updates no more frequently than once every two years.

IX. Conclusions

As shown in Table 1, the proposed mitigation measures, when fully implemented, will reduce the DPM emissions from the LATC Yard by approximately 63% from 2005

levels. These emission reductions will concurrently lower any existing predicted health risk associated with the facility operations. Other federal, state, and related air pollution control measures and plans will supplement the current and future emission reduction discussed in this Plan.

X. References

CARB, 2007. *Health Risk Assessment for the Union Pacific Railroad Los Angeles Transportation Center Rail Yard.* (*http://www.arb.ca.gov/railyard/hra/up_latc_hra.pdf.*)

EPA, 2008. *Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder*, EPA420-R-08-001a, USEPA-OTAQ, May 2008.

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Appendix A
Detailed Emission Calculations

Locomotive Data

Summary of Emissions from Locomotives
Los Angeles Transportation Center, Los Angeles, CA

	DPM Emissions (tpy)				
Source	2005	2007	2010	2015	2020
Line Haul	0.7	0.6	0.6	0.5	0.4
Switch	2.5	2.4	2.4	2.3	2.0
Total	**3.2**	**3.0**	**3.0**	**2.7**	**2.4**

Notes:

1. The emissions for 2005 and 2007 are actual emissions.
2. The emission estimates for 2010, 2015, and 2020 are forcased assuming 1% per year growth after 2007, UPRR-projected fleet turnover, and new EPA emission standards.

Emission Calculations

Initial calculations:
2005 and 2007 from actual data
2012 based on 2005 activity and projected 2012 fleet composition without EPA (2004) controls

	2005	2007	2012 fleet @ '05 activity
Through trains and power	0.20	0.22	0.21
Freight and power in yard	0.53	0.34	0.41
Yardops	2.46	2.43	2.45
Total	3.19	2.99	3.07

Growth factor calculations	
2007 observed growth v. 2005	0.991
Annual growth after 2007	1.01
Growth factors	
2012 relative to 2005	1.041
2015 relative to 2012	1.030
2020 relative to 2012	1.083

Projected and interpolated emissions with growth, but without EPA (2004) controls

	2005	2007	2010	2012
Through trains and power	0.20	0.22	0.22	0.21
Freight and power in yard	0.53	0.34	0.39	0.43
Yardops	2.46	2.43	2.50	2.55
Total	3.19	2.99	3.11	3.20

Control factor calculations from EPA 2008 Final RIA (Tables 3-72 and 3-82)

	2010 Base	2010 Contro	2012 Base	2012 Control	2015 Control	2020 Control
EPA Line Haul Emissions	22300	21580	21956	19597	16928	12550
EPA Switcher Emissions	2051	1959	2094	1928	1883	1744
(assumes 1.6%/year growth in fuel use)						

Control factors (2015 and 2020 calculated relative to 2012 fleet)

	2010	2012	2015	2020
Line Haul Control Factor	0.968	0.893	0.824	0.564
Switcher Control Factors	0.955	0.921	0.931	0.797

RESULTS:
Projected and interpolated emissions with growth and control

	2005	2007	2010	2012	2015	2020
Through trains and power	0.20	0.22	0.21	0.19	0.16	0.12
Freight and power in yard	0.53	0.34	0.38	0.38	0.32	0.23
Yardops	2.46	2.43	2.39	2.35	2.25	2.03
Total	3.19	2.99	2.98	2.92	2.74	2.38

Locomotive Data
2007 Sample Calculations

Activity Types

Description	Activity Code	Number of Events/Year	Locomotives per Consist	Emission Factor Group	Locomotives per Consist Working	Fraction of Calif Fuel
Thru from S to E Arriving	1	509	3.318	1	3.318	0.5
Thru from S to E Departing	2	509	3.31	1	3.31	0.5
Thru from E to S Arriving	3	1361	3.12	1	3.12	0.5
Thru from E to S Departing	4	1361	3.12	1	3.12	0.5
Thru from N to E Arriving	5	122	2.934	1	2.934	0.5
Thru from N to E Departing	6	122	2.934	1	2.934	0.5
Thru from E to N Arriving	7	304	2.168	1	2.168	0.5
Thru from E to N Departing	8	304	2.168	1	2.168	0.5
Thru from S to N Arriving	9	602	2.889	1	2.889	0.5
Thru from S to N Departing	10	602	2.889	1	2.889	0.5
Thru from N to S Arriving	11	1462	2.853	1	2.853	0.5
Thru from N to S Departing	12	1462	2.853	1	2.853	0.5
Arrivals from E	13	496	3.262	2	3.262	0
Arrivals from S	14	29	2	2	2	0
Arrivals from N	15	348	2.805	2	2.805	0
Departures to E	16	460	3.552	2	3.552	0.9
Departures to W	17	623	2.941	2	2.941	0.9
Departures to S	18	72	1.736	2	1.736	0.9
Arr & Dep from S to E Arriving	19	7	2.571	2	2.571	0.5
Arr & Dep from S to E Departing	20	7	2.714	2	2.714	0.5
Arr & Dep from E to S Arriving	21	559	2.587	2	2.587	0.5
Arr & Dep from E to S Departing	22	559	2.592	2	2.592	0.5
Arr & Dep from N to E Arriving	23	4	2.5	2	2.5	0.5
Arr & Dep from N to E Departing	24	4	3.5	2	3.5	0.5
Arr & Dep from E to N Arriving	25	101	2.98	2	2.98	0.5
Arr & Dep from E to N Departing	26	101	2.96	2	2.96	0.5
Arr & Dep from S to N Arriving	27	20	3.1	2	3.1	0.5
Arr & Dep from S to N Departing	28	20	2.9	2	2.9	0.5
Arr & Dep from N to S Arriving	29	354	2.232	2	2.232	0.5
Arr & Dep from N to S Departing	30	354	2.24	2	2.24	0.5
Power thru from E to S Arriving	31	58	4.741	1	1.5	0.5
Power thru from E to S Departing	32	58	4.724	1	1.5	0.5
Power thru from N to E Arriving	33	19	4.789	1	1.5	0.5
Power thru from N to E Departing	34	19	4.737	1	1.5	0.5
Power thru from E to N Arriving	35	5	6.2	1	1.5	0.5
Power thru from E to N Departing	36	5	6.2	1	1.5	0.5
Power thru from S to N Arriving	37	4	2.5	1	1.5	0.5
Power thru from S to N Departing	38	4	2.5	1	1.5	0.5
Power thru from N to S Arriving	39	151	3.43	1	1.5	0.5
Power thru from N to S Departing	40	151	3.43	1	1.5	0.5
Power from E	41	5	2.6	3	1.5	0.9
Power from S	42	499	1.944	3	1.5	0.9
Power from N	43	3	7	3	1.5	0.9
Power to E	44	5	2.4	3	1.5	0
Power to N	45	9	3.778	3	1.5	0
Power to S	46	3	4.333	3	1.5	0
Yard operations - 4 switcher shifts	47	362	4	4	4	1
Yard operations - 6 switcher shift	48	362	6	4	6	1

Emission Factors Weighted by Model/Tier/ZTR Fractions - DPM g/hr per Locomotive

Consist Groups	Group ID	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel (221 ppm S)												
Thru Trains and Power Moves Thru	1	14.96	25.12	48.40	46.88	107.35	228.80	284.36	355.67	533.96	634.43	723.13
Arriving and Departing Trains	2	13.04	25.46	42.22	42.70	93.11	216.11	278.66	351.48	567.72	666.47	748.34
Arriving and Departing Power	3	19.66	27.53	49.10	44.49	97.61	225.78	283.62	366.33	571.98	715.36	822.40
Yard Switchers	4	31.00	31.00	56.00	23.00	76.00	128.51	139.18	171.12	269.91	313.29	406.02
47-State Fuel (2639 ppm S)												
Thru Trains and Power Moves Thru	1	14.96	25.12	48.40	46.88	107.35	239.86	301.80	380.62	569.59	677.09	773.74
Arriving and Departing Trains	2	13.04	25.46	42.22	42.70	93.11	225.49	295.89	376.91	604.73	706.01	795.03
Arriving and Departing Power	3	19.66	27.53	49.10	44.49	97.61	235.42	301.19	392.94	609.24	756.92	872.27
Yard Switchers	4	31.00	31.00	56.00	23.00	76.00	128.51	139.18	171.12	269.91	313.29	406.02

Note: Idle-NonZTR is the average per-locomotive idle emission rate for the fraction of locomotives not equipped with ZTR/Auto start-stop technology

Locomotive Model Distributions
Thru Trains and Power Moves Thru

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	**No**	0.0000	0.0018	0.0919	0.0018	0.0718	0.0015	0.0011	0.0000	0.0120	0.0289	0.0000
Pre Tier 0	**Yes**	0.0000	0.0007	0.0001	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0060	0.0000
Tier 0	**No**	0.0000	0.0001	0.0062	0.0000	0.0581	0.1711	0.0018	0.0000	0.0082	0.0278	0.0004
Tier 0	**Yes**	0.0000	0.0006	0.0002	0.0000	0.0016	0.0009	0.0003	0.0000	0.0000	0.0088	0.0000
Tier 1	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000	0.0001	0.0000
Tier 1	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.1621	0.0000	0.0000	0.0000	0.0097	0.0000
Tier 2	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000
Tier 2	**Yes**	0.0000	0.0000	0.0019	0.0000	0.0000	0.1236	0.0000	0.0000	0.0000	0.1964	0.0000

Arriving and Departing Trains

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	**No**	0.0000	0.0145	0.0595	0.0006	0.0204	0.0066	0.0001	0.0000	0.0142	0.0613	0.0000
Pre Tier 0	**Yes**	0.0009	0.0272	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0083	0.0000
Tier 0	**No**	0.0000	0.0022	0.0085	0.0000	0.0180	0.2646	0.0003	0.0000	0.0082	0.0221	0.0002
Tier 0	**Yes**	0.0000	0.0022	0.0036	0.0000	0.0007	0.0018	0.0001	0.0000	0.0000	0.0032	0.0000
Tier 1	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0035	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.2557	0.0000	0.0000	0.0000	0.0004	0.0000
Tier 2	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0011	0.0000
Tier 2	**Yes**	0.0000	0.0000	0.0013	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0884	0.0000

Arriving and Departing Power

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	**No**	0.0000	0.0000	0.0469	0.0000	0.1328	0.0000	0.0000	0.0000	0.0156	0.0625	0.0000
Pre Tier 0	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	**No**	0.0000	0.0000	0.0000	0.0000	0.1797	0.1797	0.0000	0.0000	0.0234	0.0313	0.0000
Tier 0	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.1641	0.0000	0.0000	0.0000	0.0078	0.0000
Tier 2	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	**Yes**	0.0000	0.0000	0.0078	0.0000	0.0000	0.0859	0.0000	0.0000	0.0000	0.0625	0.0000

Yard Switchers

Technology	ZTR/AESS	Switcher	GP-3x	GP-4x	SD-50	GP-60	SD-7x	SD-90	Dash 7	Dash 8	Dash 9	C-60
Pre Tier 0	**No**	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pre Tier 0	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 0	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 1	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	**No**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tier 2	**Yes**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Track Segment	Segment Number	Length (mi)
West side main line	1	0.3735
NW corner main line	2	0.1551
W end of northside main line	3	0.2498
E end track at San Pablo	4	0.2294
NW corner to W side yard entrance	5	0.4680
W side yard entrance to W end of IM track	6	0.1863
W end of IM track	7	0.1529
NW corner to N limit of yard	8	0.2557
Track from N limit to northside main line	9	0.1680
W side yard entrance to balloon track	10	0.0832
Balloon track section 1	11	0.1000
Balloon track section 2	12	0.1212
Balloon track section 3	13	0.3139
Balloon track section 4 to E end of main yard	14	0.2895
Yard operations area - main yard	15	0.7123
Yard operations area - E end to San Pablo	16	0.7645
E end of northside mainline	17	0.2498
W and center of track to San Pablo	18	0.5352
E end of IM track	19	0.3567

Movement Type	Activity Code	Segment Number	Speed (mph)	Duty Cycle Number	Non-ZTR Idle Time (hrs)	ZTR Idle Time (hrs)	Fraction of Segment Moving
Thru from S to E	1 and 2	1	10	1	0	0	1
"	1 and 2	2	10	1	0	0.166667	1
"	1 and 2	3	10	1	0	0	1
"	1 and 2	17	10	1	0	0	1
"	1 and 2	18	10	1	0	0	1
"	1 and 2	4	10	1	0	0	1
Thru from E to S	3 and 4	4	10	1	0	0	1
"	3 and 4	18	10	1	0	0	1
"	3 and 4	17	10	1	0	0	1
"	3 and 4	3	10	1	0	0.166667	1
"	3 and 4	2	10	1	0	0	1
"	3 and 4	1	10	1	0	0	1
Thru from N to E	5 and 6	1	10	1	0	0	1
"	5 and 6	8	10	1	0	0	1
Thru from E to N	7 and 8	8	10	1	0	0	1
"	7 and 8	1	10	1	0	0	1
Thru from S to N	9 and 10	9	10	1	0	0	1
"	9 and 10	3	10	1	0	0	1
"	9 and 10	17	10	1	0	0	1
"	9 and 10	18	10	1	0	0	1
"	9 and 10	4	10	1	0	0	1
Thru from N to S	11 and 12	4	10	1	0	0	1
"	11 and 12	18	10	1	0	0	1
"	11 and 12	17	10	1	0	0	1
"	11 and 12	3	10	1	0	0.166667	1
"	11 and 12	9	10	1	0	0	1
Arrivals from E	13	4	10	1	0	0	1
"	13	18	10	1	0	0	1
"	13	17	10	1	0	0	1
"	13	3	10	1	0	0	1
"	13	2	10	1	0	0	1
"	13	5	10	1	0	0	1
"	13	6	10	1	0	0	1
"	13	7	10	1	0	0	1
"	13	19	10	1	0	0	1
"	13	18	10	1	0	0	1
"	13	4	10	1	0.5	0.5	1
Arrivals from S	14	1	10	1	0	0	1
"	14	2	10	1	0	0	1
"	14	3	10	1	0	0	1
"	14	17	10	1	0	0	1
"	14	18	10	1	0	0	1
"	14	4	10	1	0.5	0.5	1
Arrivals from N	15	8	10	1	0	0	1
"	15	5	10	1	0	0	1
"	15	6	10	1	0	0	1
"	15	7	10	1	0	0	1
"	15	19	10	1	0	0	1
"	15	18	10	1	0	0	1
"	15	4	10	1	0.5	0.5	1
Departures to E	16	4	10	1	1.5	0.5	0
Departures to W	17	7	10	1	1.5	0.5	0
"	17	6	10	1	0	0	1
"	17	5	10	1	0	0	1
"	17	8	10	1	0	0	1
Departures to S	18	4	10	1	1.5	0.5	0
"	18	18	10	1	0	0	1
"	18	17	10	1	0	0	1
"	18	3	10	1	0	0	1

Movement Type	Activity Code	Segment Number	Speed (mph)	Duty Cycle Number	Non-ZTR Idle Time (hrs)	ZTR Idle Time (hrs)	Fraction of Segment Moving
"	18	2	10	1	0	0	1
"	18	1	10	1	0	0	1
Arr & Dep from S to E	19	1	10	1	0	0	1
"	19	2	10	1	0	0.166667	1
"	19	3	10	1	0	0	1
"	19	17	10	1	0	0	1
"	19	18	10	1	0	0	1
"	19	4	10	1	0	0	1
"	19	15	10	1	0	0.5	0
Arr & Dep from E to S	21	4	10	1	0	0	1
"	21	18	10	1	0	0	1
"	21	17	10	1	0	0	1
"	21	3	10	1	0	0.166667	1
"	21	2	10	1	0	0	1
"	21	1	10	1	0	0	1
"	21	15	10	1	0	0.5	0
Arr & Dep from N to E	23	1	10	1	0	0	1
"	23	8	10	1	0	0	1
"	23	15	10	1	0	0.5	0
Arr & Dep from E to N	25	8	10	1	0	0	1
"	25	1	10	1	0	0	1
"	25	15	10	1	0	0.5	0
Arr & Dep from S to N	27	9	10	1	0	0	1
"	27	3	10	1	0	0	1
"	27	17	10	1	0	0	1
"	27	18	10	1	0	0	1
"	27	4	10	1	0	0	1
"	27	15	10	1	0	0.5	0
Arr & Dep from N to S	29	4	10	1	0	0	1
"	29	18	10	1	0	0	1
"	29	17	10	1	0	0	1
"	29	3	10	1	0	0.166667	1
"	29	9	10	1	0	0	1
"	29	15	10	1	0	0.5	0
Power thru from E to S	31	4	10	1	0	0	1
"	31	18	10	1	0	0	1
"	31	17	10	1	0	0	1
"	31	3	10	1	0	0.166667	1
"	31	2	10	1	0	0	1
"	31	1	10	1	0	0	1
Power thru from N to E	33	1	10	1	0	0	1
"	33	8	10	1	0	0	1
Power thru from E to N	35	8	10	1	0	0	1
"	35	1	10	1	0	0	1
Power thru from S to N	37	9	10	1	0	0	1
"	37	3	10	1	0	0	1
"	37	17	10	1	0	0	1
"	37	18	10	1	0	0	1
"	37	4	10	1	0	0	1
Power thru from N to S	39	4	10	1	0	0	1
"	39	18	10	1	0	0	1
"	39	17	10	1	0	0	1
"	39	3	10	1	0	0.166667	1
"	39	9	10	1	0	0	1
Power from E	41	4	10	1	0	0	0.3990021
"	41	18	10	1	0	0	0.3990021
"	41	17	10	1	0	0	0.3990021
"	41	3	10	1	0	0	0.3990021
"	41	2	10	1	0	0	0.3990021

Movement Type	Activity Code	Segment Number	Speed (mph)	Duty Cycle Number	Non-ZTR Idle Time (hrs)	ZTR Idle Time (hrs)	Fraction of Segment Moving
"	41	5	10	1	0	0	0.3990021
"	41	10	10	1	0	0	0.3990021
"	41	11	10	1	0	0	0.3990021
"	41	12	10	1	0	0	0.3990021
"	41	13	10	1	0	0	0.3990021
"	41	14	10	1	0	0	0.3990021
"	41	18	10	1	0	0	0.3990021
"	41	4	10	1	0	0	0.3990021
"	41	4	10	1	0	0	0.6009979
"	41	18	10	1	0	0	0.6009979
"	41	14	10	1	0	0	0.6009979
"	41	13	10	1	0	0	0.6009979
"	41	12	10	1	0	0	0.6009979
"	41	11	10	1	0	0	0.6009979
"	41	10	10	1	0	0	0.6009979
"	41	5	10	1	0	0	0.6009979
"	41	6	10	1	0	0	0.6009979
Power from S	42	1	10	1	0	0	0.3990021
"	42	2	10	1	0	0	0.3990021
"	42	3	10	1	0	0	0.3990021
"	42	17	10	1	0	0	0.3990021
"	42	18	10	1	0	0	0.3990021
"	42	4	10	1	0	0	0.3990021
"	42	1	10	1	0	0	0.6009979
"	42	5	10	1	0	0	0.6009979
"	42	6	10	1	0	0	0.6009979
Power from N	43	8	10	1	0	0	1
"	43	5	10	1	0	0	1
"	43	10	10	1	0	0	1
"	43	11	10	1	0	0	1
"	43	12	10	1	0	0	1
"	43	13	10	1	0	0	1
"	43	14	10	1	0	0	1
"	43	18	10	1	0	0	1
"	43	4	10	1	0	0	1
Power to E	44	4	10	1	0.5	0.5	0
Power to N	45	7	10	1	0.5	0.5	0
"	45	6	10	1	0	0	1
"	45	5	10	1	0	0	1
"	45	8	10	1	0	0	1
Power to S	46	4	10	1	0.5	0.5	1
"	46	18	10	1	0	0	1
"	46	14	10	1	0	0	1
"	46	13	10	1	0	0	1
"	46	12	10	1	0	0	1
"	46	11	10	1	0	0	1
"	46	10	10	1	0	0	1
"	46	5	10	1	0	0	1
"	46	1	10	1	0	0	1

Notes
(1) Segment numbers listed as negative values are in-yard power moves from arriving trains to service or from service to departing trains
(2) Non-ZTR Idling is the duration of an idle event when units without ZTR continue to idle after ZTR-equipped units have shut down
(3) Idling All is the duration of idling during which all locomotives continue to idle
(4) Fraction of Segment Moving is the fraction of the length of the segment over which the movement occurs
(On departure, power moves from service are assumed to connect to trains 20% of the way into a track segment)

Yard Operations	Activity Code	Segment Number	Duty Cycle Number	Non-ZTR Idle Time (hrs)	ZTR Idle Time (hrs)	Working Time (hrs)
Day and Night Shift - Main Yard	47	15	2	0	0	11.2
Day and Night Shift - E end to San Pablo	47	16	2	0	0	4
Graveyard Shift - Main Yard	48	15	2	0	0	5.6
Graveyard Shift - E end to San Pablo	48	16	2	0	0	2

Duty Cycles (Percent of Time by Notch)	Duty Cycle Number	Idle	DB	N1	N2	N3	N4	N5	N6	N7	N8
Train and Consist Movements	1	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Yard Operations	2	59.8%	0.0%	12.4%	12.3%	5.8%	3.6%	3.6%	1.5%	0.2%	0.8%

Example 1 -- WB Arriving Intermodal Train

Parameter	Value
Activity Code	13
Number of Events	496
Locomotives per Consist on Train	3.262
Emission Factor Group	2
Fraction of California Fuel	0.00

Route Followed	Segment Number	Length (miles)	Speed (mph)	Power Move	Non-ZTR Idle (hrs)	ZTR Idle (hrs)	Locomotive Hours Moving	Locomotive Hours NonZTR Idle	Locomotive Hours ZTR Idle
E end track at San Pablo	4	0.229	10	N	0	0	37.12	0.00	0.00
W and center of track to San Pablo	18	0.535	10	N	0	0	86.59	0.00	0.00
E end of northside mainline	17	0.250	10	N	0	0	40.42	0.00	0.00
W end of northside main line	3	0.250	10	N	0	0	40.42	0.00	0.00
NW corner main line	2	0.155	10	N	0	0	25.09	0.00	0.00
NW corner to W side yard entrance	5	0.468	10	N	0	0	75.72	0.00	0.00
W side yard entrance to W end of IM track	6	0.186	10	N	0	0	30.14	0.00	0.00
W end of IM track	7	0.153	10	N	0	0	24.74	0.00	0.00
E end of IM track	19	0.357	10	N	0	0	57.71	0.00	0.00
W and center of track to San Pablo	18	0.535	10	N	0	0	86.59	0.00	0.00
E end track at San Pablo	4	0.229	10	N	0.5	0.5	37.12	808.98	808.98
Total							*541.66*	*808.98*	*808.98*

Emission Factors - Arriving and Departing Trains	Group ID	Idle-NonZTR	Idle-All	DB	N1	N2	N3	N4	N5	N6	N7	N8
California Fuel (221 ppm S)	2	13.04	25.46	42.22	42.70	93.11	216.11	278.66	351.48	567.72	666.47	748.34
47-State Fuel (2639 ppm S)	2	13.04	25.46	42.22	42.70	93.11	225.49	295.89	376.91	604.73	706.01	795.03
Fuel Fraction Adjusted Rates		*13.04*	*25.46*	*42.22*	*42.70*	*93.11*	*225.49*	*295.89*	*376.91*	*604.73*	*706.01*	*795.03*
Duty Cycle Moving	1	0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Weighted g/hr emissions	1	0.00	0.00	0.00	21.35	46.56	0.00	0.00	0.00	0.00	0.00	0.00

	Moving	Idle-NonZTR	Idle-All
Emission Rate (g/hr)	67.91	13.04	25.46
Locomotive Hours	541.66	808.98	808.98
Total Emissions (g/yr)	**36781**	**10549**	**20597**

Drayage Trucks

Summary of Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
Los Angeles Transportation Center, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2005 Emission Factors (g/mi)					2005 DPM Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
186,771	1.5	280,156.88	6.54	17.68	29.52	2.47	0.24	2.02	5.46	9.12	0.76	0.07

Idling Exhaust Emissions

Number of Truck Trips	Idling		2005 Emission Factors (g/hr)					2005 DPM Emissions (tpy)				
	(min/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
186,771	30	93,385.63	16.16	52.99	100.38	2.85	0.550	1.66	5.45	10.34	0.29	0.06

Notes:

1. Number of truck trips calculated from UPRR provided gate counts. The total gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis).
2. VMT and idling time per trip estimated based on personal observation.
3. Running exhaust emission factors from EMFAC2007 with the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 with the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
Los Angeles Transportation Center, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2007 Emission Factors (g/mi)					2007 DPM Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
179,473	1.5	269,208.75	6.10	16.14	27.92	2.07	0.03	1.81	4.79	8.28	0.61	0.01

Idling Exhaust Emissions

Number of Truck Trips	Idling		2007 Emission Factors (g/hr)					2007 DPM Emissions (tpy)				
	(min/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
179,473	30	89,736.25	14.57	51.00	104.62	2.36	0.063	1.44	5.04	10.35	0.23	0.01

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis).
2. VMT and idling time per trip estimated based on personal observation.
3. Running exhaust emission factors from EMFAC2007 with the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 with the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
Los Angeles Transportation Center, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2010 Emission Factors (g/mi)					2010 DPM Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
184,911	1.5	277,366.04	5.03	12.99	23.47	1.52	0.03	1.54	3.97	7.17	0.46	0.01

Idling Exhaust Emissions

Number of Truck Trips	Idling		2010 Emission Factors (g/hr)					2010 DPM Emissions (tpy)				
	(min/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
184,911	30	92,455.35	12.49	48.29	110.26	1.79	0.063	1.27	4.92	11.24	0.18	0.01

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis). A growth factor of 1% per year was applied.
2. VMT and idling time per trip estimated based on personal observation.
3. Running exhaust emission factors from EMFAC2007 with the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 with the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
Los Angeles Transportation Center, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2015 Emission Factors (g/mi)					2015 DPM Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
194,343	1.5	291,514.50	2.93	7.36	13.83	0.68	0.03	0.94	2.36	4.44	0.22	0.01

Idling Exhaust Emissions

Number of Truck Trips	Idling		2015 Emission Factors (g/hr)					2015 DPM Emissions (tpy)				
	(min/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
194,343	30	97,171.50	9.89	44.71	117.38	1.00	0.063	1.06	4.79	12.58	0.11	0.01

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis). A growth factor of 1% per year was applied.
2. VMT and idling time per trip estimated based on personal observation.
3. Running exhaust emission factors from EMFAC2007 with the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 with the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Summary of Emissions from Heavy-Heavy Duty Diesel-Fueled Trucks
Los Angeles Transportation Center, Los Angeles, CA

Running Exhaust Emissions

Number of Truck Trips	VMT per Trip	VMT per Year	2020 Emission Factors (g/mi)					2020 DPM Emissions (tpy)				
			ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
204,256	1.5	306,384.67	1.78	4.44	8.88	0.29	0.03	0.60	1.50	3.00	0.10	0.01

Idling Exhaust Emissions

Number of Truck Trips	Idling		2020 Emission Factors (g/hr)					2020 DPM Emissions (tpy)				
	(min/trip)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
204,256	30	102,128.22	8.57	42.79	121.00	0.53	0.063	0.96	4.82	13.63	0.06	0.01

Notes:

1. Number of truck trips calculated from UPRR provided gate counts for CY 2007. The total 2007 gate counts were increased by 25% to account for bobtail trucks (trucks without a chassis or trailer and trucks with an empty chassis). A growth factor of 1% per year was applied.
2. VMT and idling time per trip estimated based on personal observation.
3. Running exhaust emission factors from EMFAC2007 with the BURDEN output option.
4. Idling exhaust emission factors from EMFAC2007 with the EMFAC output option.
5. Emission factor calculations assumed an average speed of 15 mph.

Title : Los Angeles County Avg Annual CYr 2005 Default Title
Version : Emfac2007 V2.3 Nov 1 2006 ** WIS Enabled **
Run Date : 2008/07/28 20:24:01
Scen Year: 2005 -- All model years in the range 1965 to 2005 selected
Season : Annual
Area : Los Angeles County Average
I/M Stat : Enhanced Interim (2005) -- Using I/M schedule for area 59 Los Angeles (SC)
Emissions: Tons Per Day

Calendar Year	2005	2007	2010	2015	2020
	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL	HHDT-DSL
Vehicles	27425	22811	24869	27982	29788
VMT/1000	5538	4551	4993	6088	6766
Trips	138783	115435	125849	141601	150742
Reactive Organic Gas Emissions					
Run Exh	39.07	29.96	27.13	19.16	12.81
Idle Exh	0.82	0.62	0.58	0.51	0.47
Start Ex	0	0	0	0	0
Total Ex	39.9	30.58	27.71	19.68	13.28
Diurnal	0	0	0	0	0
Hot Soak	0	0	0	0	0
Running	0	0	0	0	0
Resting	0	0	0	0	0
Total	39.9	30.58	27.71	19.68	13.28
Carbon Monoxide Emissions					
Run Exh	105.2	78.81	69.25	47.06	30.72
Idle Exh	2.7	2.16	2.23	2.33	2.37
Start Ex	0	0	0	0	0
Total Ex	107.91	80.98	71.48	49.39	33.09
Oxides of Nitrogen Emissions					
Run Exh	175.11	135.6	124.05	86.7	59.5
Idle Exh	5.12	4.44	5.1	6.11	6.7
Start Ex	0	0	0	0	0
Total Ex	180.23	140.04	129.15	92.81	66.2
Carbon Dioxide Emissions (000)					
Run Exh	17.5	14.38	15.78	19.24	21.38
Idle Exh	0.34	0.28	0.31	0.34	0.37
Start Ex	0	0	0	0	0
Total Ex	17.84	14.66	16.09	19.58	21.75
PM10 Emissions					
Run Exh	15.05	10.38	8.35	4.56	2.17
Idle Exh	0.15	0.1	0.08	0.05	0.03
Start Ex	0	0	0	0	0
Total Ex	15.19	10.48	8.43	4.61	2.2
TireWear	0.22	0.18	0.2	0.24	0.27
BrakeWr	0.17	0.14	0.16	0.19	0.21
Total	15.59	10.8	8.78	5.04	2.67
Lead	0	0	0	0	0
SOx	1.48	0.14	0.15	0.19	0.21
Fuel Consumption (000 gallons)					
Gasoline	0	0	0	0	0
Diesel	1605.41	1319.79	1447.7	1762.62	1957.55

Title : Los Angeles County Avg Annual CYr 2005 Default Title
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2008/07/29 07:32:52
Scen Year: 2005 -- All model years in the range 1965 to 2005 selected
Season : Annual
Area : Los Angeles
****

Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average Los Angeles

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Temperature: 60F **Relative Humidity: 65%**

Calendar Year		**2005**	**2007**	**2010**	**2015**	**2020**
Pollutant	Speed MPH	HHD DSL	HHD DSL	HHD DSL	HHD DSL	HHD DSL
ROG	0	16.163	14.57	12.487	9.892	8.569
CO	0	52.988	51.001	48.291	44.707	42.794
Nox	0	100.383	104.615	110.258	117.379	121
CO2	0	6617.134	6617.133	6617.137	6617.135	6617.135
SOx	0	0.55	0.063	0.063	0.063	0.063
PM10	0	2.845	2.358	1.792	1.002	0.525
PM10-Tire	0	0	0	0	0	0
PM10-Brake	0	0	0	0	0	0
Gasoline (mi/gal)	0	0	0	0	0	0
Diesel (mi/gal)	0	0	0	0	0	0

Cargo Handling Equipment

Summary of Emissions from Cargo Handling Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	No of Units	Annual Hours of Operation	Load Factor	2005 Emission Factors (g/bhp-hr)					2005 Emissions (tpy)				
									THC	CO	NOx	DPM	SOx	THC	CO	NOx	DPM	SOx
RTG	98462	Mi Jack	1000R	1984	300	1	2,920	0.43	0.9965	5.4833	12.8557	0.7230	0.0521	0.414	2.277	5.338	0.300	0.022
RTG	98463	Mi Jack	1000R	1984	300	1	0	0.43	0.9965	5.4833	12.8557	0.7230	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98464	Mi Jack	1000R	1984	300	1	0	0.43	0.9965	5.4833	12.8557	0.7230	0.0521	0.000	0.000	0.000	0.000	0.000
Top Pick	89066	Mi Jack	MJ9090	1990	335	1	60	0.59	0.6811	3.3000	9.0164	0.4547	0.0597	0.009	0.043	0.118	0.006	0.001
Top Pick	89879	Taylor	TEC 155H	1998	150	1	1,040	0.59	0.5505	2.8920	6.9482	0.3734	0.0597	0.056	0.293	0.705	0.038	0.006
Fork Lift	60003	Taylor	THD200S	2000	154	1	260	0.30	0.5307	2.8296	6.8159	0.3536	0.0597	0.007	0.037	0.090	0.005	0.001
RTG	90403	Mi Jack	1000RC	2004	300	1	2,920	0.43	0.0906	0.9456	4.1618	0.0972	0.0521	0.038	0.393	1.728	0.040	0.022
RTG	90409	Mi Jack	1000RC	2004	300	1	2,920	0.43	0.0906	0.9456	4.1618	0.0972	0.0521	0.038	0.393	1.728	0.040	0.022
Yard Hostler	32008	Ottawa	Commando 30	2003	150	1	8,000	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.066	0.736	1.354	0.056	0.016
Yard Hostler	32009	Ottawa	Commando 30	2003	150	1	8,000	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.066	0.736	1.354	0.056	0.016
Yard Hostler	32010	Ottawa	Commando 30	2003	150	1	8,000	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.066	0.736	1.354	0.056	0.016
Yard Hostler	42041	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42042	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42043	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42044	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42045	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42046	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42047	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42048	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42049	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Yard Hostler	42050	Ottawa	Commando 30	2004	150	1	8,000	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.043	0.729	1.204	0.044	0.016
Totals						**21**								**1.193**	**12.929**	**25.814**	**1.035**	**0.278**

Notes:

1. Annual hours of operation estimates provided by Ton Madrigal of PARSEC and Raul Perez of UPRR.
2. Emission factors and load factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet.
3. The load factor for yard hostlers is based on data collected by UPRR and BNSF for yard hostlers operating at ICTF and Hobart.

Summary of Emissions from Cargo Handling Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	2007 Emission Factors (g/bhp-hr)					2007 Emissions (tpy)				
										THC	CO	NOx	DPM	SOx	THC	CO	NOx	DPM	SOx
RTG	98462	Mi Jack	1000R	1984	300	Retired in 2006	1	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98463	Mi Jack	1000R	1984	300	Retired in 2006	1	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98464	Mi Jack	1000R	1984	300	Retired in 2007	1	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
Top Pick	89066	Mi Jack	MJ9090	1990	335	12/31/2008	1	59	0.59	0.6811	3.3000	9.0164	0.4547	0.0597	0.009	0.042	0.115	0.006	0.001
Top Pick	89879	Taylor	TEC 155H	1998	150	12/31/2009	1	1,017	0.59	0.5505	2.8920	6.9482	0.3734	0.0597	0.055	0.287	0.689	0.037	0.006
Fork Lift	60003	Taylor	THD200S	2000	154	Removed from Yard	1	0	0.30	0.5307	2.8296	6.8159	0.3536	0.0597	0.000	0.000	0.000	0.000	0.000
RTG	90403	Mi Jack	1000RC	2004	300	12/31/2010	1	2,855	0.43	0.0906	0.9456	4.1618	0.0972	0.0521	0.037	0.384	1.690	0.039	0.021
RTG	90409	Mi Jack	1000RC	2004	300	12/31/2010	1	2,855	0.43	0.0906	0.9456	4.1618	0.0972	0.0521	0.037	0.384	1.690	0.039	0.021
RTG	90711	Mi Jack	1200 R	2007	325	At Purchase	1	2,855	0.43	0.000	2.460	2.910	0.110	0.052	0.000	1.082	1.280	0.048	0.023
Yard Hostler	32008	Ottawa	Commando 30	2003	150	12/31/2010	1	7,822	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.065	0.719	1.324	0.055	0.015
Yard Hostler	32009	Ottawa	Commando 30	2003	150	12/31/2010	1	7,822	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.065	0.719	1.324	0.055	0.015
Yard Hostler	32010	Ottawa	Commando 30	2003	150	12/31/2010	1	7,822	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.065	0.719	1.324	0.055	0.015
Yard Hostler	42041	Ottawa	Commando 30	2004	150	12/31/2011	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42042	Ottawa	Commando 30	2004	150	12/31/2011	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42043	Ottawa	Commando 30	2004	150	12/31/2011	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42044	Ottawa	Commando 30	2004	150	12/31/2012	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42045	Ottawa	Commando 30	2004	150	12/31/2012	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42046	Ottawa	Commando 30	2004	150	12/31/2013	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42047	Ottawa	Commando 30	2004	150	12/31/2013	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42048	Ottawa	Commando 30	2004	150	12/31/2013	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42049	Ottawa	Commando 30	2004	150	12/31/2013	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Yard Hostler	42050	Ottawa	Commando 30	2004	150	12/31/2013	1	7,822	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.042	0.712	1.178	0.043	0.015
Totals							**22**								**0.755**	**11.461**	**21.211**	**0.762**	**0.273**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet.
2. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
3. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
4. Hours of operation are equal to the 2005 hours of operation x (2007 Lift Count/2005 Lift Count).
5. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF.
   All other load factors are the default values from the CARB Spreadsheet Model.
6. It was assumed that newly purchased equipment was put into service on July 1 of the purchase year.
7. UPRR does not own/operate the yard hostlers at LATC. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
8. Emission factors for the 2007 Mi Jack RTG are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox.
9. Hours of operation for the 2007 Mi Jack RTG is equal to the average hours of operation for all other RTGs.

Summary of Emissions from Cargo Handling Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	2010 Emission Factors (g/bhp-hr)					2010 Emissions (tpy)				
										THC	CO	NOx	DPM	SOx	THC	CO	NOx	DPM	SOx
RTG	98462	Mi Jack	1000R	1984	300	Retired in 2006	1	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98463	Mi Jack	1000R	1984	300	Retired in 2006	1	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98464	Mi Jack	1000R	1984	300	Retired in 2007	1	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
Top Pick	89066	Mi Jack	MJ9090	1990	335	Retired in 2008	1	0	0.59	0.6811	3.3000	9.0164	0.4547	0.0597	0.000	0.000	0.000	0.000	0.000
Top Pick	89879	Taylor	TEC 155H	1998	150	12/31/2009	1	1,048	0.59	0.5505	2.8920	6.9482	*0.1867*	0.0597	0.056	0.296	0.710	0.019	0.006
Fork Lift	60003	Taylor	THD200S	2000	154	Removed from Yard	1	0	0.30	0.5307	2.8296	6.8159	0.3536	0.0597	0.000	0.000	0.000	0.000	0.000
RTG	90403	Mi Jack	1000RC	2004	300	12/31/2010	1	2,942	0.43	0.0906	0.9456	4.1618	0.0972	0.0521	0.038	0.396	1.741	0.041	0.022
RTG	90409	Mi Jack	1000RC	2004	300	12/31/2010	1	2,942	0.43	0.0906	0.9456	4.1618	0.0972	0.0521	0.038	0.396	1.741	0.041	0.022
RTG	90711	Mi Jack	1200 R	2007	325	At Purchase	1	2,942	0.43	0.000	2.460	2.910	0.017	0.052	0.000	1.115	1.319	0.007	0.024
Top Pick	TBD	TBD	TBD	2008	*335*	At Purchase	1	1,058	0.59	0.000	2.600	3.000	0.023	0.052	0.000	0.599	0.692	0.005	0.012
Yard Hostler	32008	Ottawa	Commando 30	2003	150	12/31/2010	1	8,059	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.067	0.741	1.364	0.057	0.016
Yard Hostler	32009	Ottawa	Commando 30	2003	150	12/31/2010	1	8,059	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.067	0.741	1.364	0.057	0.016
Yard Hostler	32010	Ottawa	Commando 30	2003	150	12/31/2010	1	8,059	0.20	0.2501	2.7810	5.1174	0.2136	0.0597	0.067	0.741	1.364	0.057	0.016
Yard Hostler	42041	Ottawa	Commando 30	2004	150	12/31/2011	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42042	Ottawa	Commando 30	2004	150	12/31/2011	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42043	Ottawa	Commando 30	2004	150	12/31/2011	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42044	Ottawa	Commando 30	2004	150	12/31/2012	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42045	Ottawa	Commando 30	2004	150	12/31/2012	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42046	Ottawa	Commando 30	2004	150	12/31/2013	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42047	Ottawa	Commando 30	2004	150	12/31/2013	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42048	Ottawa	Commando 30	2004	150	12/31/2013	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42049	Ottawa	Commando 30	2004	150	12/31/2013	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Yard Hostler	42050	Ottawa	Commando 30	2004	150	12/31/2013	1	8,059	0.20	0.1639	2.7540	4.5529	0.1648	0.0597	0.044	0.734	1.213	0.044	0.016
Totals							**23**								**0.769**	**12.364**	**22.427**	**0.723**	**0.292**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet.
2. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
3. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
4. Hours of operation are equal to the 2005 hours of operation x (predicted 2008 Lift Count/2005 Lift Count).
5. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF. All other load factors are the default values from the CARB Spreadsheet Model.
6. It was assumed that newly purchased equipment was put into service on July 1 of the purchase year.
7. UPRR does not own/operate the yard hostlers at LATC. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
8. Emission factors for the 2007 Mi Jack RTG are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. The 2009 DPM emission factor was adjusted to reflect the installation of a Level 3 VDECS. Per the CHE Regulation, new equipment with an engine rated less than Tier 4 must install a VDECS within 1 year of purchase. Since this unit was placed into service at the end of 2007, the VDECS would be required by the end of 2008 and the reductions will be achieved beginning Jan 1, 2009.
9. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/08 compliance deadline would begin on 1/1/09).
10. Emission factors for the 2008 Top Pick are the EPA Certification for an engine of that size. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. The 2010 DPM emission factor was adjusted to reflect the installation of a Level 3 VDECS. Per the CHE Regulation, new equipment with an engine rated less than Tier 4 must install a VDECS within 1 year of purchase. Since this unit was placed into service at the end of 2008, the VDECS would be required by the end of 2009 and the reductions will be achieved beginning Jan 1, 2010.

Summary of Emissions from Cargo Handling Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	2015 Emission Factors (g/bhp-hr)					2015 Emissions (tpy)				
										THC	CO	NOx	DPM	SOx	THC	CO	NOx	DPM	SOx
RTG	98462	Mi Jack	1000R	1984	300	Retired in 2006	0	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98463	Mi Jack	1000R	1984	300	Retired in 2006	0	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98464	Mi Jack	1000R	1984	300	Retired in 2007	0	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
Top Pick	89066	Mi Jack	MJ9090	1990	335	Retired in 2008	0	0	0.59	0.6811	3.3000	9.0164	0.4547	0.0597	0.000	0.000	0.000	0.000	0.000
Top Pick	89879	Taylor	TEC 155H	1998	150	12/31/2009	1	1,101	0.59	0.5505	2.8920	6.9482	*0.1867*	0.0597	0.059	0.311	0.746	0.020	0.006
Fork Lift	60003	Taylor	THD200S	2000	154	Removed from Yard	0	0	0.30	0.5307	2.8296	6.8159	0.3536	0.0597	0.000	0.000	0.000	0.000	0.000
RTG	90403	Mi Jack	1000RC	2004	300	12/31/2010	1	3,092	0.43	0.0906	0.9456	4.1618	*0.0486*	0.0521	0.040	0.416	1.830	0.021	0.023
RTG	90409	Mi Jack	1000RC	2004	300	12/31/2010	1	3,092	0.43	0.0906	0.9456	4.1618	*0.0486*	0.0521	0.040	0.416	1.830	0.021	0.023
RTG	90711	Mi Jack	1200 R	2007	325	At Purchase	1	3,092	0.43	0.000	2.460	2.910	0.017	0.052	0.000	1.172	1.386	0.008	0.025
Top Pick	TBD	TBD	TBD	2008	*335*	At Purchase	1	1,112	0.59	0.000	2.600	3.000	0.023	0.052	0.000	0.630	0.727	0.005	0.013
Yard Hostler	32008	Ottawa	Commando 30	2003	150	12/31/2010	1	8,470	0.20	0.2501	2.7810	5.1174	0.0100	0.0597	0.070	0.779	1.433	0.003	0.017
Yard Hostler	32009	Ottawa	Commando 30	2003	150	12/31/2010	1	8,470	0.20	0.2501	2.7810	5.1174	0.0100	0.0597	0.070	0.779	1.433	0.003	0.017
Yard Hostler	32010	Ottawa	Commando 30	2003	150	12/31/2010	1	8,470	0.20	0.2501	2.7810	5.1174	0.0100	0.0597	0.070	0.779	1.433	0.003	0.017
Yard Hostler	42041	Ottawa	Commando 30	2004	150	12/31/2011	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42042	Ottawa	Commando 30	2004	150	12/31/2011	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42043	Ottawa	Commando 30	2004	150	12/31/2011	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42044	Ottawa	Commando 30	2004	150	12/31/2012	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42045	Ottawa	Commando 30	2004	150	12/31/2012	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42046	Ottawa	Commando 30	2004	150	12/31/2013	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42047	Ottawa	Commando 30	2004	150	12/31/2013	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42048	Ottawa	Commando 30	2004	150	12/31/2013	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42049	Ottawa	Commando 30	2004	150	12/31/2013	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Yard Hostler	42050	Ottawa	Commando 30	2004	150	12/31/2013	1	8,470	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.046	0.771	1.275	0.003	0.017
Totals							**18**								**0.808**	**12.994**	**23.571**	**0.112**	**0.307**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet.
2. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
3. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
4. Hours of operation are equal to the 2005 hours of operation x (predicted 2008 Lift Count/2005 Lift Count).
5. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF.
   All other load factors are the default values from the CARB Spreadsheet Model.
6. It was assumed that newly purchased equipment was put into service on July 1 of the purchase year.
7. UPRR does not own/operate the yard hostlers at LATC. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
8. Emission factors for the 2007 Mi Jack RTG are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. The 2009 DPM emission factor was adjusted to reflect the installation of a Level 3 VDECS. Per the CHE Regulation, new equipment with an engine rated less than Tier 4 must install a VDECS within 1 year of purchase. Since this unit was placed into service at the end of 2007, the VDECS would be required by the end of 2008 and the reductions will be achieved beginning Jan 1, 2009.
9. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/08 compliance deadline would begin on 1/1/09).
10. Emission factors for the 2008 Top Pick are the EPA Certification for an engine of that size. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. The 2010 DPM emission factor was adjusted to reflect the installation of a Level 3 VDECS. Per the CHE Regulation, new equipment with an engine rated less than Tier 4 must install a VDECS within 1 year of purchase. Since this unit was placed into service at the end of 2008, the VDECS would be required by the end of 2009 and the reductions will be achieved beginning Jan 1, 2010.

Summary of Emissions from Cargo Handling Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	2020 Emission Factors (g/bhp-hr)					2020 Emissions (tpy)				
										THC	CO	NOx	DPM	SOx	THC	CO	NOx	DPM	SOx
RTG	98462	Mi Jack	1000R	1984	300	Retired in 2006	0	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98463	Mi Jack	1000R	1984	300	Retired in 2006	0	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
RTG	98464	Mi Jack	1000R	1984	300	Retired in 2007	0	0	0.43	0.9965	5.4833	12.8557	0.3615	0.0521	0.000	0.000	0.000	0.000	0.000
Top Pick	89066	Mi Jack	MJ9090	1990	335	Retired in 2008	0	0	0.59	0.6811	3.3000	9.0164	0.4547	0.0597	0.000	0.000	0.000	0.000	0.000
Top Pick	89879	Taylor	TEC 155H	1998	150	12/31/2009	1	1,157	0.59	0.5505	2.8920	6.9482	*0.1867*	0.0597	0.062	0.327	0.784	0.021	0.007
Fork Lift	60003	Taylor	THD200S	2000	154	Removed from Yard	0	0	0.30	0.5307	2.8296	6.8159	0.3536	0.0597	0.000	0.000	0.000	0.000	0.000
RTG	90403	Mi Jack	1000RC	2004	300	12/31/2010	1	3,249	0.43	0.0906	0.9456	4.1618	*0.0486*	0.0521	0.042	0.437	1.923	0.022	0.024
RTG	90409	Mi Jack	1000RC	2004	300	12/31/2010	1	3,249	0.43	0.0906	0.9456	4.1618	*0.0486*	0.0521	0.042	0.437	1.923	0.022	0.024
RTG	90711	Mi Jack	1200 R	2007	325	At Purchase	1	3,249	0.43	0.000	2.460	2.910	0.017	0.052	0.000	1.231	1.457	0.008	0.026
Top Pick	TBD	TBD	TBD	2008	*335*	At Purchase	1	1,169	0.59	0.000	2.600	3.000	0.023	0.052	0.000	0.662	0.764	0.006	0.013
Yard Hostler	32008	Ottawa	Commando 30	2003	150	12/31/2010	1	8,902	0.20	0.2501	2.7810	5.1174	0.0100	0.0597	0.074	0.819	1.506	0.003	0.018
Yard Hostler	32009	Ottawa	Commando 30	2003	150	12/31/2010	1	8,902	0.20	0.2501	2.7810	5.1174	0.0100	0.0597	0.074	0.819	1.506	0.003	0.018
Yard Hostler	32010	Ottawa	Commando 30	2003	150	12/31/2010	1	8,902	0.20	0.2501	2.7810	5.1174	0.0100	0.0597	0.074	0.819	1.506	0.003	0.018
Yard Hostler	42041	Ottawa	Commando 30	2004	150	12/31/2011	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42042	Ottawa	Commando 30	2004	150	12/31/2011	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42043	Ottawa	Commando 30	2004	150	12/31/2011	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42044	Ottawa	Commando 30	2004	150	12/31/2012	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42045	Ottawa	Commando 30	2004	150	12/31/2012	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42046	Ottawa	Commando 30	2004	150	12/31/2013	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42047	Ottawa	Commando 30	2004	150	12/31/2013	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42048	Ottawa	Commando 30	2004	150	12/31/2013	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42049	Ottawa	Commando 30	2004	150	12/31/2013	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Yard Hostler	42050	Ottawa	Commando 30	2004	150	12/31/2013	1	8,902	0.20	0.1639	2.7540	4.5529	0.0100	0.0597	0.048	0.811	1.340	0.003	0.018
Totals							**18**								**0.849**	**13.657**	**24.773**	**0.118**	**0.323**

Notes:

1. Emission factors from CARB's Cargo Handling Equipment Emission Calculation Spreadsheet.
2. Per footnote 6 in the ISOR for the CHE Regulation - a 2007 on-road yard truck would have a DPM emission rate of 0.01 g/bhp-hr.
3. For non-yard hostler CHE, assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.
4. Hours of operation are equal to the 2005 hours of operation x (predicted 2008 Lift Count/2005 Lift Count).
5. The load factor for yard hostlers was adjusted from the CARB Spreadsheet Model default of 0.65 to 0.20, based on new data that was collected by both UPRR and BNSF. All other load factors are the default values from the CARB Spreadsheet Model.
6. It was assumed that newly purchased equipment was put into service on July 1 of the purchase year.
7. UPRR does not own/operate the yard hostlers at LATC. It was assumed that owner treated these units as a fleet and compliance deadlines were determined based on the 2005 fleet mix.
8. Emission factors for the 2007 Mi Jack RTG are from the CARB Certification for the engine. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. The 2009 DPM emission factor was adjusted to reflect the installation of a Level 3 VDECS. Per the CHE Regulation, new equipment with an engine rated less than Tier 4 must install a VDECS within 1 year of purchase. Since this unit was placed into service at the end of 2007, the VDECS would be required by the end of 2008 and the reductions will be achieved beginning Jan 1, 2009.
9. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/08 compliance deadline would begin on 1/1/09).
10. Emission factors for the 2008 Top Pick are the EPA Certification for an engine of that size. The certification includes a Nox + NMHC value only. It was assumed that it was all Nox. The 2010 DPM emission factor was adjusted to reflect the installation of a Level 3 VDECS. Per the CHE Regulation, new equipment with an engine rated less than Tier 4 must install a VDECS within 1 year of purchase. Since this unit was placed into service at the end of 2008, the VDECS would be required by the end of 2009 and the reductions will be achieved beginning Jan 1, 2010.

Heavy Equipment

Summary of Emissions from Heavy Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	No of Units	Annual Hours of Operation	Load Factor	Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2005 Emissions (tpy)				
									ROG	CO	NOx	DPM	SOx	Part 1 (lb/hr)	Part 2 (lb/yr)	ROG	CO	NOx	DPM	SOx
Crane		Grove	RT650E	2003	275	1	2,190	0.43	0.2332	0.2332	0.2332	0.1053	0.0478	-	-	0.067	0.067	0.067	0.030	0.014
Fork Lift	80402	Lull	John Deere	2004	150	1	8,000	0.30	0.3500	0.3500	0.3500	0.1861	0.0548	-	-	0.139	0.139	0.139	0.074	0.022
Fork Lift		Toyota		1999	150	1	2,190	0.30	0.3500	0.3500	0.3500	0.5778	0.0548	-	-	0.038	0.038	0.038	0.063	0.006
Totals																**0.243**	**0.243**	**0.243**	**0.167**	**0.041**

Notes:
1. Annual hours of operation estimates provided by Ton Madrigal of PARSEC and Raul Perez of UP.
2. Emission factors and load factors from CARB's OFFROAD2006 model.
3. Evaporative emissions are negligible.

Summary of Emissions from Heavy Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2007 Emissions (tpy)				
										ROG	CO	NOx	DPM	SOx	Part 1 (lb/hr)	Part 2 (lb/yr)	ROG	CO	NOx	DPM	SOx
Crane		Grove	RT650E	2003	275	12/31/2010	1	2,141	0.43	0.2332	0.2332	0.2332	0.1053	0.0478	-	-	0.065	0.065	0.065	0.029	0.013
Fork Lift	80402	Lull	John Deere	2004	150	Removed from Yard	0	0	0.30	0.3500	0.3500	0.3500	0.1861	0.0548	-	-	0.000	0.000	0.000	0.000	0.000
Fork Lift		Toyota		1999	150	12/31/2009	1	2,141	0.30	0.3500	0.3500	0.3500	0.5778	0.0548	-	-	0.037	0.037	0.037	0.061	0.006
Totals																	**0.102**	**0.102**	**0.102**	**0.091**	**0.019**

Notes:
1. Hours of operation are equal to the 2005 hours of operation x (2007 Lift Counts/2005 Lift Counts).
2. Emission factors and load factors from CARB's OFFROAD2006 model.
3. Evaporative emissions are negligible.

Summary of Emissions from Heavy Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2010 Emissions (tpy)				
										ROG	CO	NOx	DPM	SOx	Part 1 (lb/hr)	Part 2 (lb/yr)	ROG	CO	NOx	DPM	SOx
Crane		Grove	RT650E	2003	275	12/31/2010	1	2,206	0.43	0.2332	0.2332	0.2332	0.1053	0.0478	-	-	0.067	0.067	0.067	0.030	0.014
Fork Lift	80402	Lull	John Deere	2004	150	Removed from Yard	0	0	0.30	0.3500	0.3500	0.3500	0.1861	0.0548	-	-	0.000	0.000	0.000	0.000	0.000
Fork Lift		Toyota		1999	150	12/31/2009	1	2,206	0.30	0.3500	0.3500	0.3500	0.2889	0.0548	-	-	0.038	0.038	0.038	0.032	0.006
Totals																	**0.105**	**0.105**	**0.105**	**0.062**	**0.020**

Notes:

1. Hours of operation are equal to the 2005 hours of operation x (predicted 2010 Lift Counts/2005 Lift Counts).
2. Emission factors and load factors from CARB's OFFROAD2006 model.
3. Evaporative emissions are negligible.
4. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/09 compliance deadline would begin on 1/1/10).
5. Assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.

Summary of Emissions from Heavy Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2015 Emissions (tpy)				
										ROG	CO	NOx	DPM	SOx	Part 1 (lb/hr)	Part 2 (lb/yr)	ROG	CO	NOx	DPM	SOx
Crane		Grove	RT650E	2003	275	12/31/2010	1	2,279	0.43	0.2332	0.2332	0.2332	0.0527	0.0478	-	-	0.069	0.069	0.069	0.016	0.014
Fork Lift	80402	Lull	John Deere	2004	150	Removed from Yard	0	0	0.30	0.3500	0.3500	0.3500	0.0931	0.0548	-	-	0.000	0.000	0.000	0.000	0.000
Fork Lift		Toyota		1999	150	12/31/2009	1	2,279	0.30	0.3500	0.3500	0.3500	0.2889	0.0548	-	-	0.040	0.040	0.040	0.033	0.006
Totals																	**0.109**	**0.109**	**0.109**	**0.048**	**0.020**

Notes:

1. Hours of operation are equal to the 2005 hours of operation x (predicted 2015 Lift Counts/2005 Lift Counts).
2. Emission factors and load factors from CARB's OFFROAD2006 model.
3. Evaporative emissions are negligible.
4. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/09 compliance deadline would begin on 1/1/10).
5. Assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.

Summary of Emissions from Heavy Equipment
Los Angeles Transportation Center, Los Angeles, CA

Equipment Type	Equipment ID	Make	Model	Year	Rating (hp)	CHE Rule Compliance Deadline	No of Units	Annual Hours of Operation	Load Factor	Exhaust & Crankcase Emissions (g/hp-hr)					VOC Evaporative Emissions		2020 Emissions (tpy)				
										ROG	CO	NOx	DPM	SOx	Part 1 (lb/hr)	Part 2 (lb/yr)	ROG	CO	NOx	DPM	SOx
Crane		Grove	RT650E	2003	275	12/31/2010	1	2,437	0.43	0.2332	0.2332	0.2332	0.0527	0.0478	-	-	0.074	0.074	0.074	0.017	0.015
Fork Lift	80402	Lull	John Deere	2004	150	Removed from Yard	0	0	0.30	0.3500	0.3500	0.3500	0.0931	0.0548	-	-	0.000	0.000	0.000	0.000	0.000
Fork Lift		Toyota		1999	150	12/31/2009	1	0	0.30	0.3500	0.3500	0.3500	0.2889	0.0548	-	-	0.000	0.000	0.000	0.000	0.000
Totals																	**0.074**	**0.074**	**0.074**	**0.017**	**0.015**

Notes:

1. Hours of operation are equal to the 2005 hours of operation x (predicted 2020 Lift Counts/2005 Lift Counts).
2. Emission factors and load factors from CARB's OFFROAD2006 model.
3. Evaporative emissions are negligible.
4. Assumed the equipment achieved compliance with the CHE Regulation on the compliance deadline (i.e. the emissions reductions for a unit with a 12/31/09 compliance deadline would begin on 1/1/10).
5. Assumed the lowest level of control allowed by the CHE Regulation, which is the installation of a Level 2 (50-84% reduction) VDECS. To be conservative a 50% reduction was assumed.

TRUs and Reefer Cars

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Los Angeles Transportation Center, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (lb/hr)	Part 2 (lb/yr)	2005 Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	20	4	1,460	0.56	2.85	6.78	6.43	0.71	0.07	-	-	1.46	3.47	3.29	0.366	0.04
Railcar	34	Diesel	4	4	1,460	0.53	3.23	7.49	6.71	0.79	0.07	-	-	0.38	0.87	0.78	0.091	0.01
Total			**24**		**2,920**									**1.84**	**4.34**	**4.07**	**0.457**	**0.04**

Notes:

1. Based on the average horsepower distribution in the OFFROAD 2006 model.
2. UPRR staff estimate that there are 8-10 TRUs and 0-2 reefer cars and in the Yard at any given time. To be conservative, these estimates were increased by 100%.
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. Emission factors from OFFROAD 2006 model.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Los Angeles Transportation Center, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2007 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (lb/hr)	Part 2 (lb/yr)	2007 Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	20	4	1,460	0.56	2.85	6.78	6.43	0.71	0.07	-	-	1.46	3.47	3.29	0.366	0.04
Railcar	34	Diesel	4	4	1,460	0.53	3.23	7.49	6.71	0.79	0.07	-	-	0.38	0.87	0.78	0.091	0.01
Total			**24**		**2,920**									**1.84**	**4.34**	**4.07**	**0.457**	**0.04**

Notes:

1. Based on the average horsepower distribution in the OFFROAD 2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (2007 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. Emission factors from OFFROAD 2006 model.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Los Angeles Transportation Center, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2010 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (lb/hr)	Part 2 (lb/yr)	2010 Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	21	4	1,460	0.56	2.85	6.78	6.43	0.22	0.07	-	-	1.54	3.65	3.46	0.118	0.04
Railcar	34	Diesel	5	4	1,460	0.53	3.23	7.49	6.71	0.22	0.07	-	-	0.47	1.09	0.97	0.032	0.01
Total			**26**		**2,920**									**2.00**	**4.73**	**4.43**	**0.150**	**0.05**

Notes:

1. Based on the average horsepower distribution in the OFFROAD 2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (predicted 2010 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. DPM emission factor from TRU ATCM, Table 3.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Los Angeles Transportation Center, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2015 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (lb/hr)	Part 2 (lb/yr)	2015 Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	22	4	1,460	0.56	2.85	6.78	6.43	0.02	0.07	-	-	1.61	3.82	3.62	0.011	0.04
Railcar	34	Diesel	5	4	1,460	0.53	3.23	7.49	6.71	0.02	0.07	-	-	0.47	1.09	0.97	0.003	0.01
Total			**27**		**2,920**									**2.08**	**4.91**	**4.60**	**0.014**	**0.05**

Notes:

1. Based on the average horsepower distribution in the OFFROAD 2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (predicted 2015 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. DPM emission factor from TRU ATCM, Table 3 - ULETRU factor was used.
7. Evaporative emissions are negligible.

Summary of Emissions from Transport Refrigeration Units and Refrigerated Railcars
Los Angeles Transportation Center, Los Angeles, CA

TRU Equip Type	Average Rating (hp)[1]	Fuel Type	Average No. Units in Yard[2]	Hours of Operation (hr/day)[3]	Hours of Operation (hr/yr)[4]	Load Factor[5]	2020 Emission Factors (g/hp-hr)[6] HC	CO	NOx	DPM	SOx	VOC Evaporative Emission Factors[6, 7] Part 1 (lb/hr)	Part 2 (lb/yr)	2020 Emissions (tpy) HC	CO	NOx	DPM	SOx
Container	28.56	Diesel	23	4	1,460	0.56	2.85	6.78	6.43	0.02	0.07	-	-	1.68	3.99	3.79	0.012	0.04
Railcar	34	Diesel	5	4	1,460	0.53	3.23	7.49	6.71	0.02	0.07	-	-	0.47	1.09	0.97	0.003	0.01
Total			**28**		**2,920**									**2.15**	**5.08**	**4.76**	**0.015**	**0.05**

Notes:

1. Based on the average horsepower distribution in the OFFROAD 2006 model.
2. Number of TRUs in yard is equal to 2005 TRUs x (predicted 2020 lift count/2005 lift count).
3. From CARB's Staff Report: ISOR, ATCM for TRUs, Section V.a.2.
4. It was assumed that the number of units and the annual hours of operations remains constant, with individual units cycling in and out of the yard.
5. Load factors are the default factors from the OFFROAD 2006 model.
6. DPM emission factor from TRU ATCM, Table 3 - ULETRU factor was used.
7. Evaporative emissions are negligible.

Light Duty Yard Trucks

Summary of Emissions from Light Duty Diesel-Fueled Trucks
Los Angeles Transportation Center, Los Angeles, CA

Running Exhaust Emissions

Equipment Type	Equip. ID	Vehicle Class	Make	Model	Year	Annual VMT	Emission Factors (g/mi)					Emissions (tpy)				
							ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
Pickup	3518	LHDD	Dodge	2500	2003	5,000	0.32	1.65	6.69	0.08	0.05	0.002	0.009	0.037	0.000	0.000

Idling Exhaust Emissions

Equip. ID	Vehicle Class	Make	Model	Year	Idling		Emission Factors (g/hr)					Emissions (tpy)				
					(min/day)	(hr/yr)	ROG	CO	NOx	DPM	SOx	ROG	CO	NOx	DPM	SOx
3518	LHDD	Dodge	2500	2003	15	91	3.173	26.300	75.051	0.753	0.357	0.000	0.003	0.008	0.000	0.000

Notes:
1. Annual VMT provided by Tony Madrigal of PARSEC.
2. Emission factor calculations assumed an average speed of 15 mph.
3. Running exhaust emission factors calculated using the EMFAC-WD 2006 model with the BURDEN output option.
4. Idling exhaust emission factors for LHDT1 vehicles calculated using the EMFAC-WD 2006 model with the EMFAC output option.

Title : Statewide totals Avg Annual CYr 2005 Default Title
Version : Emfac working draft V2.23.7.60616 Sp: 2.20.8+FCF+IM+Bugs+BER+Accr+IMDlg
Run Date : 2006/10/05 13:37:10
Scen Year: 2005 -- Model year 2003 selected
Season : Annual
Area : Statewide totals Average
I/M Stat : Enhanced Interim (2005) -- Using I/M schedule for area 59 Los Angeles (SC)
Emissions: Tons Per Day

****

	LHDT1-DSL
Vehicles	15991
VMT/1000	758
Trips	201147
Reactive Organic Gas Emissions	
Run Exh	0.27
Idle Exh	0
Start Ex	0
Total Ex	0.27
Diurnal	0
Hot Soak	0
Running	0
Resting	0
Total	0.27
Carbon Monoxide Emissions	
Run Exh	1.38
Idle Exh	0.02
Start Ex	0
Total Ex	1.4
Oxides of Nitrogen Emissions	
Run Exh	5.59
Idle Exh	0.05
Start Ex	0
Total Ex	5.63
Carbon Dioxide Emissions (000)	
Run Exh	0.43
Idle Exh	0
Start Ex	0
Total Ex	0.44
PM10 Emissions	
Run Exh	0.07
Idle Exh	0
Start Ex	0
Total Ex	0.07
TireWear	0.01
BrakeWr	0.01
Total	0.09
Lead	0
SOx	0.04
Fuel Consumption (000 gallons)	
Gasoline	0
Diesel	39.24

Title : Statewide totals Avg Annual CYr 2005 Default Title
Version : Emfac working draft V2.23.7.60616 Sp: 2.20.8+FCF+IM+Bugs+BER+Accr+IMDlg +FCF2+Po
Run Date : 2006/10/11 12:20:17
Scen Year: 2005 -- Model year 2003 selected
Season : Annual
Area : Statewide totals
****
Year: 2005 -- Model Years 2003 to 2003 Inclusive --
Emfac working draft Emission Factors: V2.23.7.60616 Sp: 2.20.8+FCF+IM+Bugs+BER+Accr+IMDlg

State Average

Table 1: Running Exhaust Emissions (grams/mile; grams/idle-hour)

Pollutant Name: Reactive Org Gases Temperature: 65F Relative Humidity: 60%

Speed MPH	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL
0	0	23.103	3.173	17.027

Pollutant Name: Carbon Monoxide Temperature: 65F Relative Humidity: 60%

Speed MPH	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL
0	0	141.992	26.3	106.721

Pollutant Name: Oxides of Nitrogen Temperature: 65F Relative Humidity: 60%

Speed MPH	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL
0	0	1.561	75.051	23.965

Pollutant Name: Sulfur Dioxide Temperature: 65F Relative Humidity: 60%

Speed MPH	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL
0	0	0.049	0.357	0.143

Pollutant Name: PM10 Temperature: 65F Relative Humidity: 60%

Speed MPH	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL
0	0	0	0.753	0.23

Pollutant Name: PM10 - Tire Wear Temperature: 65F Relative Humidity: 60%

Speed MPH	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL
0	0	0	0	0

Pollutant Name: PM10 - Break Wear Temperature: 65F Relative Humidity: 60%

Speed MPH	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL
0	0	0	0	0

Appendix B
Growth Rate Data

Union Pacific Railroad: Key Operating Measures

Annual Gross Ton-Miles, Revenue Ton-Miles, & Diesel Fuel Consumption

Year	U.P. Revenue Ton Miles per Gallon of Diesel Consumed	% Change	Diesel Fuel Consumed *(millions)*	% Change	U.P. Revenue Ton Miles *(billions)*	% Change	U.P. Gross Ton Miles (*billions)*	% Change
1996	392	-	824	-	323	-	760	-
1997	368	-	1,229	-	452	-	860	13.2%
1998	376	2.2%	1,150	-6.4%	432	-4.4%	826	-3.9%
1999	380	1.2%	1,244	8.2%	473	9.5%	898	8.7%
2000	375	-1.3%	1,293	3.9%	485	2.6%	931	3.7%
2001	391	4.2%	1,287	-0.5%	504	3.8%	958	2.8%
2002	394	0.8%	1,315	2.2%	519	3.0%	994	3.8%
2003	401	1.6%	1,330	1.1%	533	2.7%	1019	2.5%
2004	397	-1.0%	1,377	3.5%	546	2.5%	1038	1.8%
2005	406	2.2%	1,353	-1.7%	549	0.5%	1044	0.6%
2006	412	1.6%	1,372	1.4%	565	3.0%	1073	2.7%
2007	424	2.8%	1,326	-3.4%	562	-0.6%	1052	-1.9%
Average % Change		**1.4%**		**0.8%**		**2.3%**		**2.1%**

Notes:
Source: Union
Quarterly Earnings Releases and Analyst Presentations (4th Quarter each year 1997-2007)
http://www.up.com/investors/earnings/index.shtml

1996 data from UPRR Report R-1 to Surface Transportation Board, provided as reference point to pre-UP/SP merger.

1996-1997 data not included in averages shown above. UP/SP merger was completed on Sept. 11, 1996; 1998 is first year that is representative for comparison to current operations.

Union Pacific Railroad
Lift Count Data for the LATC Rail Yard

Calendar Year	Lift Count
2005	192,565
2007	188,279
2008	190,162
2009	192,063
2010	193,984
2011	195,924
2012	197,883
2013	199,862
2014	201,861
2015	203,879
2016	205,918
2017	207,977
2018	210,057
2019	212,157
2020	214,279

Notes:

1. Lift counts for 2005 and 2007 are acutal data provided by UPRR.
2. Lift counts for 2008-2020 assume a 1% per year growth rate from 2007.